JULY 1, 2008

NOTES ON ENGINEERING RESEARCH & DEVELOPMENT (AN IIT KANPUR PUBLICATION)

NERD

EDITION 0

Sci-Tech Secy now in Hostels too!

Another revolutionary step which was taken this year was the introduction of a **Science and Technology Secretary in HECs (Hall Executive Committees)** of undergraduate hostels. HEC is a group of students managing activities and issues at the hall/hostel level. IIT Kanpur believes in democratic system of student governance. These students in the HEC are elected by residents of the hall for tenure of a year. HEC is led by the President of the Hall, and constitutes Cultural Secretary, Sports Secretary, Mess Secretary et cetera.

The post of Science and Technology Secretary was introduced in the Hostels with a vision of serving as a hub for the students, informing and guiding the students about upcoming technical activities at institute as well as hall level, and organizing the hall level activities- workshops/lectures/competitions, by coordinating with the Science and Technology Council, thus giving a "run up" to **Takneek**- the Intra-IIT Kanpur technical festival and **Techkriti**.

It is hoped that the long run benefits of this initiative will be the increased quality and quantity of participation in technical activities and festivals, inside as well as outside IITK. We might also see students involved in technical activities contributing more efficiently to the hall festivals like Hall Days if there is a person in HEC to look after their interests and encourage more people to make "robotic" and "electronic" gadgets, structures and decorative for the functions.

We strongly recommend that you meet these newly introduced members in your respective hostels (once they are allotted to you) once you are in IIT Kanpur:

Hall 2- Vikram Rastogi (vikras@iitk.ac.in)
Hall 3-Abhilash Jindal (ajindal@iitk.ac.in)
Hall 5- Pratyush Pandey (prpandey@iitk.ac.in)

Come, be a part of the Scientific Renaissance of students!!

Feeding The Fish- performing in Opening Night of Techkriti'08- February 14.

While you were toiling for JEE...

In Orientation'06, we were addressed as- "***You are the future of our country, be like coffee beans, spread your color throughout the globe.***" Symbolizing the freedom of expression, the zeal to accomplish, the spirit of innovation and above all the passion to succeed, the team of **Techkriti 2008- the annual Science and Technology festival of IIT Kanpur**, made our heads held high in the whole world by getting Noble Laureates to speak on diverse topics in IIT Kanpur and by winning many other laurels. History was in its making!

THE GODS THEMSELVES

While you were toiling for JEE, dreams were floating free in the infinite sea of knowledge and information in **Techkriti- where ideas become reality.** We had 2007 Noble Prize Winner in Physics - Dr. Peter Grunberg and the first human cyborg Dr. Kevin Warwick enlightening the inauguration lamp in this 'Mecca of Technology'. Great talks were delivered through video conferencing with Noble Prize Winning Physicist of 2006 Dr. John C. Mather and Noble Prize Winning Chemist of 2005 Dr. Robert H. Grubbs. Live talks by Mr. Harsh Manglik (Chairman and MD, Accenture India), Mr. Bhaskar Pramanik (President, Sun Microsystems India) and Professor Colin Cunningham (Novel technology for Optical and Infrared Astronomy) were also events worth looking forward to. All these talks were organized under a singular initiative by the name **GCOSE (Grand Challenges of Science and Engineering)**.

(L to R) Dr. Prawal Sinha (Dean, Students' Affairs, IITK), Dr. Kripa Shankar (Deputy Director, IITK), Dr. Peter Grunberg (Noble Prize, 2007, Physics) lightening the lamp, K. Ashwin (General Secretary, Science and Technology Council, IITK) and Dr. Rajat Moona (Festival Chairman, Techkriti' 08.)

INITIATIVE

A panel discussion on **Global Climatic Changes and Environmental Pollution** was also held with **Young Environment Journalist Award 2007** winner Ms. Bahar Dutt moderating the thoughts of Mr. Udai P. Singh - the first person of Indian origin to lead EWRI

COVER STORY

(Environmental & Water Resources Institute), Dr. Pradipto Ghosh (Member of the Prime Minister's council on Climate Change), Dr. G.D.Agarwal – former Head of Department for Civil Engineering at IIT Kanpur, Mr. Tad Murty (famous Indian-Canadian Oceanographer) and Mr. Thomas Webler (leading environmental researcher).

But why just believe in hearsay? So we also went rowing boats in the Ganges in order to see for ourselves the level of pollution in the Ganges. A drawing competition open to all the campus residents was also organized just before Techkriti in order to promote general awareness about environmental problems.

COMPETITIONS

The open hardware contest

'Endeavour', the gadget design contest 'Gearloose' and the Electronic Circuit Design Competition had huge prizes. International Online Programming Contest (IOPC) and International Online Hacking Contest (IOHC) gave us an opportunity to mettle with the best computing brains in the world (there were participants from some of the most reputed Universities like Cambridge, Texas, Tokyo, Cornell and institutes like MIT to name a few). In order to increase interaction with industries, problem statements were invited from companies like IBM and Amazon in the Industry Defined Problem Contest (IDPC).

'RoboGames' arena was the apple of every eye, where we saw robots playing football in water in 'Battle of Atlantic', and passing through castle filled with hurdles and obstacles of varying difficulty in 'Throttle the Gears', besides many other interesting problem statements.

'Software Corner' targeted events related to programming, hacking, software development et cetera in 'Let's Game Mobile', 'Open Software contest' and 'Chaos', to name a few. The Aero Design Contest 'Turbulence' included workshops and lectures to give an insight into the field of

Technical Experiences of First Year Students

Technokratics

Are you a robot-freak? Here is some spice for you!! **Technokratics**, a new intra-IIT Kanpur robotics competition was initiated in 2007 jointly by the **Centre for Robotics, IIT Kanpur** and the **Robotics Club**. Prizes worth Rs. 10,000 were given. The intent of the competition is to develop, over time, a Robotics culture on the campus, and raise the standards of robotics activities by the campus community - both on and off of campus.

This year the competition will be organized again. While the contest will be open to all students of IIT Kanpur, it will mainly be currently

targeted towards 2nd and 3rd year undergraduates. **Each team of 2 or 3 members must contain at least one 1st year Undergraduate and one 2nd year UG student.** There is no restriction on department. Visit http://students.iitk.ac.in/roboclub/contest/index.html for further details.

Finatics and Megabucks

Finatics'08- The Finance Conclave- another festival initiated last academic year- was conducted by IME (Industrial and Management Engineering) Department of IITK on April 5 and 6, 2008. You can find more details at http://students.iitk.ac.in/finatics/index.htm

Megabucks'08 - the International Business and Entrepreneurship festival of IIT Kanpur was organized from February 28 to March 2. It had great events like '**The Droppers' Enclave**' where the speakers were some dropouts from IITs and IIMs and are at the acme today. The Entrepreneurial Exposition '**Impressario**' witnessed many start-ups who described their journey as an entrepreneur. Many venture capitalists (VCs) were present to invest their money in some brilliant business ideas. The flagship event, 'iDeas- The Business Plan Competition' had prizes worth Rs. 1.5 lakhs to be won.

Varunesh Mishra, Department of Computer Science and Engineering:
During my past one year stay at IIT Kanpur; I have learned a lot due to the challenging and wonderful environment out here. In the beginning, I started attending the lectures of various clubs of the Science and Technology council. The lecture organized by the SUN Club (the group dealing with projects provided by SUN Microsystems) related to Dynamic Programming and Multithreading was very useful for me in the programming contest 'Codewars' in Techkriti 2008. It was my first exposure to the topic, yet it was so interesting that I could not resist it. I explored JAVA programming language and made my first BRICKS game in 7 days of mid-semester recess. In the competition called the International Online Programming Contest (IOPC) in Techkriti, my team got 43rd rank worldwide, when we coded for 4 problem statements in 2 hours in C language.

After Techkriti I along with two friends decided to participate in IIT Roorkee's Technical Festival 'Cognizance.' We made a robot according to the problem statement- Build a robot which can move on rod and take and transfer balls from a stand to a basket. After much brainstorming, we were finally able to make a mechanism based on simple Newtonian physics principles. It worked after 8 days of continuous labor.

Now I am utilizing my summers in enjoying as well as learning by working on the projects of my interest. I hope God will keep the spirit of learning alive throughout my entire life. I wish the same for you. Realize yourself and utilize your period of stay here!

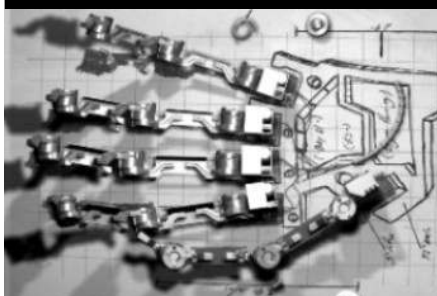**Manish Kumar Singh, Department of Chemical Engineering:**
When I came to IITK, I was totally blank on ideas. I thought of doing something, but was clueless regarding what and how. In the beginning of my stay here, I attended all the introductory lectures of the clubs and was specially attracted by the robotics club. They demonstrated a line follower robot - an assembly of wheels and sensors with some chips - which follows a line. It was all pretty exciting.

So I started attending the lectures of the robotics club and got to know about the Atmega 16 Microcontroller and also about some other chips which were essential for building a robot. Very soon the Robotics club held a competition "Technokratics" – an intra IITK robotics competition. The event got me interested. I attended all the lectures and workshops (especially the ones organized by BRiCS – an initiative by the name Build Robots, Create Science). In the BRiCS workshop, I made a robot with Lego kit. We named it "Avalanche Road Cleaner". It was a cute robot which deected obstructions in the path and swept them away.

I made further advances and during Techkriti, my team made two robots- one was a Radio Frequency controlled robot and the other was an amphibian robot. The second one involved waxing the motors and making them waterproof. We learned a lot from making them and I got so confident that I accompanied my senior to Kanpur University (when he went there to give lecture and hold workshop on microcontroller) to help him guide the people there.

The year had experiences ranging from the very bad to excellent, sad & depressed ones to happy ones. But in the end I stand at a level much higher than I was at when I entered IITK, from the perspective of intellect and maturity. And I am pretty confident that with a little effort and interest from your side, you will be able to utilize the opportunities provided by IIT Kanpur. Best luck! ♯

Spinning TaLeS

Ever imagined yourself giving a lecture to your friends and professors? Would it not be an enthralling experience for you, or would it not surge your confidence? You will certainly feel different, and this is what IIT Kanpur is – thinking out of the box, thinking differently. In July 2007, a group of people at IIT Kanpur gave birth to **TaLeS**: Talks and Lectures by Students. Yes! You read it right. Students giving talks to other students and professors! The basic philosophy of TaLeS is learning through peers. When students see their friends, seniors and juniors delivering talks and lectures, it would help them understand the concepts involved in a different manner, motivate them towards research and scientific reading and instill in them the feeling that it is entirely possible for students to contribute meaningfully to science thus bringing them closer to science instead of making them disinclined to it.

So much for philosophy behind the idea, we hear that you have many questions about TaLeS. So let's answer them one by one.

"What's the point of students giving talks?"
In regular classes, the subject matter is restricted to the content of the course. There are a variety of other topics or fields in which students might be interested in. So we came up with the solution. Ask the students who have done some reading on such topics to give lectures so that interested people can come and hear. We think that organizing Talks and Lectures delivered by students will serve several very important purposes:

- Exposing the students to the art of scientific presentations and technical talks.
- Benefit to the audience by listening to the research work being undertaken. Students will particularly benefit from knowing that their friends or seniors are doing research work and will be inspired to do the same.
- Students will be able to supplement their knowledge and correct their mistakes thus bringing them on to the correct path by receiving feedbacks for the talk.
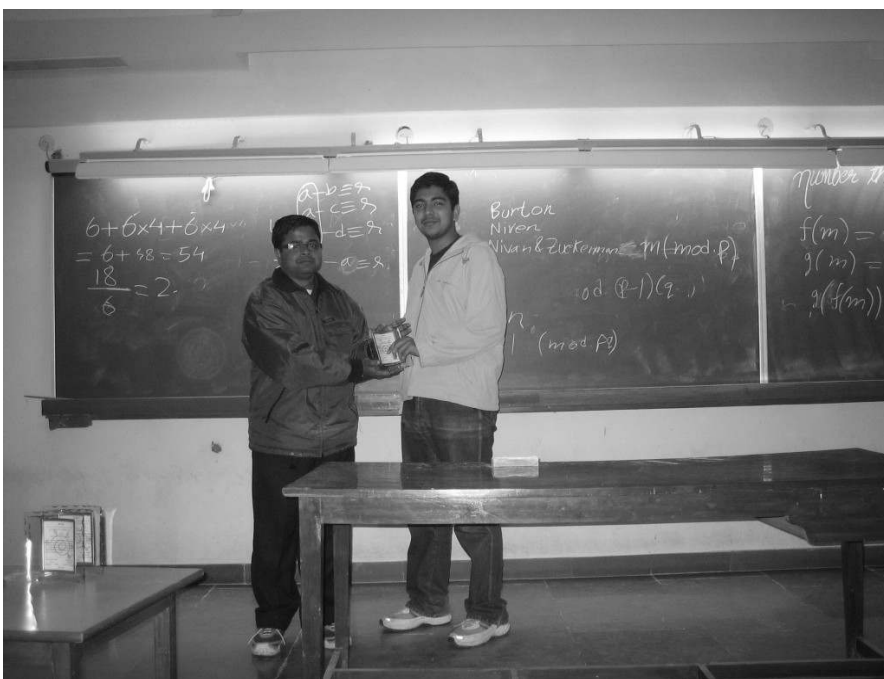
"What subjects can be taken up for giving a talk?"
Any subject that's related to science and technology can form the content of the talk. So you can play around with mathematics, or amaze the audience with some cool physics, talk about engineering, gadgets, about how stuff works and whatever else you can think of. You need NOT have done hardcore research on the topic. If you have appreciable knowledge and understanding about the subject then just jump in for giving a talk.

"Can I come to a talk to listen?"
Yes! The talks are open to all and you can come and listen to the speaker talking about science. Ask the speaker questions at any point in the talk. There is a special segment for discussions and clarification of doubts in every talk.

"Can I give a talk? I am only a first year student."
Yes, yes, yes! We don't care if you are in first year and have just stepped in the campus or are a PhD student who has been contributing to meaningful research here for last four years. Anybody who knows anything about any branch of science and engineering is welcome to give a talk. Just prepare a talk on the topic you like and follow the steps given below.

Pratyush Pandey (right) receiving a memento for giving a Talk on Black Hole Radiations and thermodynamics from Shudhasheel Ghosh, a PhD scholar in the Department of Civil engineering.

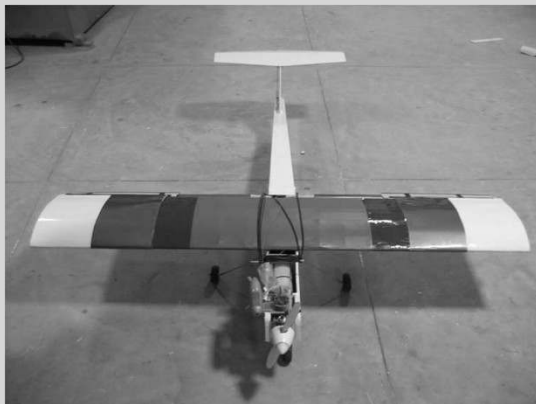# Science and Technology Council: Annual Project Roundup

"Give me a lever long enough and a fulcrum on which to place it, and I shall move the world." – Archimedes.

And trying we are, to move the world with our technical minds. In line with this, the Science and Technology Council of Students' Gymkhana, IIT Kanpur aims to foster the scientific and technical interests among the students. The Council, which came into existence in 2000, embraces the principle of fun filled learning. This is achieved through the following clubs: **Aero-modelling, Astronomy, Business, Electronics, Gliding, HAM, Programming and Robotics**.

This year, the council took many initiatives to furnish a plethora of opportunities of experiencing the practical aspect of science and technology. This was done through the new activities conducted and completion of the projects of the clubs. Let's have a glance at them:-

Techkriti 08 emblem

Aero Modelling Club:
Ranging from a simple paper plane to remote controlled balsa plane models, the club made models that won many national level competitions and prizes. Workshops have been organized on paper plane making, catapult making, balsa glider making, RC model making, flying of RC models, water rocket making etc.

Pegasus

- **Snitch**, a remote controlled flying plane cum flying saucer made in the club, won the **Lucas-TVS Innovation award of Rs 1 Lakh** in the National Level Design Contest organized by Product Development and Management Association (PDMA), India.
- The Club bagged **BEST WATER-ROCKET DESIGN AWARD** at **Students for Exploration and Development of Space (SEDS) International Conference '07,** held at VIT, Vellore.
- The Club bagged **1st and 2nd prizes in ROCKETRIX**, A Water Rocket competition in Techkriti'08, IIT Kanpur. **PEGASUS**, a retractable wing craft is the winner in Endeavour, Techkriti'08, IIT Kanpur.
- This year the club built its **FIRST Radio Controlled Flyer**.

The completed projects include Tandem wing biplane, RC glider, RC ship cum car, flying rockets et cetera.

Astronomy Club:
Observation sessions are organized by the club to introduce new members to the basic of sky gazing. Beginners are taught to handle telescope, read star charts, and the more advanced members go for deep sky objects- Galaxies, Star clusters, Nebulae etc. Introductory lecture and Hubble space telescope lectures were held. Astrophotography and 4 editions of the wall magazine speak of the regular activities of the club.

Astrophotography

Business Club:
Fostering an understanding among the students of IIT-K on the financial mechanisms on which the business and markets operates, the Business Club caters to the needs of entrepreneurs and future leaders in Business and Finance. Let's see what the club did previous year:

- **FINEIIT (FINance Enthusiasts of IIT)** is a recently formed group of students having passion for finance who meet every weekend and discuss the major financial/economic activities all over the world.
- **StockSim Game** has been conceived to provide a learning platform to novice investors without the risks associated with investing in this volatile market. Basically a Stock Simulation game on which registered students get Rs. 10 lakhs as virtual money. Investing in stocks in order to maximize the gain is the notion of this game.
- **Lecture Series** on Introduction to Stock Market, Derivatives, Budget Discussions etc.

Gliding Club:
Want to see the top view of campus? Have adventurous attitude? Gliding Club organizes regular gliding rides for students at air strip in campus. Just pay Rs. 100 and have a joy ride. You can also be a regular member of this club and get a student license for gliding!

A glider at the gliding club

Electronics Club:
Come out of your rooms. See around you. Challenges in the field of circuit design and hardware analysis are waiting for you! Let's have a look:

Musical Fountain

- Ever imagined a **Musical Fountain** in which a cathode ray oscilloscope displays a fountain which changes its form in accordance to the musical beats? **Yes, the Electronics Club, IIT Kanpur completed it as a summer project.** The LEDs work on the rhythm of the music.
- A **LCD Tilt game**, guiding a small ball to the centre by tilting, not a pencil box but a LCD screen with number of sensors. *(Remember your school days!)*
- A **Voice Recorder** was also completed as a summer project, besides a **Sound Recognition system**, which can process and recognize an audio input as words.
- A hand motion based **wireless Toy Car** and an **Overhead tank water level indicator cum pump controller** were completed last year.
- **Wireless Keyboard, Digital calculator** and **Graphic Equalizer** were some other major projects.
- A complete series of lectures followed by workshops was conducted by the club. **The lectures focused on Digital Design for 1st year students and embedded design for 2nd year students.**
- The problem statement in **"Takneek"- the intra-IITK technical festival** was to design a Stop watch with at least 2 digits (BCD output) having user's discretion for starting and stopping the watch at any instance.

Accolades

Here are a few awards won by students of IIT K at national and international level recently:

- INSA (Indian National Science Academy) Young Scientist Award 2008- Mr. Sagnik Dey (Ph.D. student under Dr. S. N. Tripathi in Civil Engineering).This award is considered to be the highest recognition of promise, creativity and excellence in a young scientist, is made annually to those distinguished for these attributes as evidenced by their research work carried out in India.
- ICONSAT 2008 (International Conference on Nano Science and Technology) Best poster award- Mr. Ankur Verma (Hall 4) and Mr. Chandrashekhar Verma (Hall 7)
- Ambuja's Young Researcher's Award 2007 - Mr. Soumik Chakraborty .This award is given to people doing post graduate studies in India after GATE.
- Pebbles Award- Mr. Abhijit Majumder (PhD, Chemical Engineering, Hall 8)

This list is by no means exhaustive. Our students have been winning several prestigious research awards throughout the year. Listing them all will require a separate newsletter by itself.

Science is of no use if it can't contribute anything to the society, and society is at loss if it can't adopt anything from science. Bearing this message in our spirit, we, the students at IIT Kanpur, present before you the edition 0 of the **NERD (Notes on Engineering Research and Development).**

The home page of IIT Kanpur asserts "*Indian Institute of Technology Kanpur is carrying out original research of significance and technology development at the cutting edge. It imparts training for students to make them competent, motivated engineers and scientists. The Institute not only celebrates freedom of thought, cultivates vision and encourages growth, but also inculcates human values and concern for the environment and the society.*" So have a glimpse of the plethora of opportunities to realize the vision of IIT Kanpur and get absorbed in the ambience of innovation and creativity! This edition is like a primer for you, a look inside what all has been done by the students to promote science and technology. Look in this edition at the initiatives taken by the students of IIT Kanpur in the previous year which have let the institute hold its head high.

Research and development in science and technology has

EDITORIAL

always been a community effort. We, the leading institute of technology of a developing country, bear the torch to get the whole Indian scientific community get involved in the **'Making of India-2020'** through this platform of NERD, wherein all articles published will be freely available for reference and further study, and we expect to grow our team throughout the length and breadth of India in times to come. We are sure that this will boost up your morale to join hands with us in this *Scientific Renaissance.*

Do realize that the times are ripe that the apple falls again, but not on Newton's head this time! This time, it has to be your head. It has to be you who can rewrite knowledge. It has to be you who will lead to a better tomorrow in the light of great scientific works that you will do. Yes, the apple is falling again. Don't miss your slice at any cost! We shall talk to you more about NERD when you land up here. Just remember what Pope John Paul II once said-

"Just as the twig is bent, so is the tree inclined!"

HAM Club:
Enthusiastic about radios and wireless communication devices? Have a look:

- **"Fox Hunt"** is an extremely popular and fun-filled activity organized by the club every year where amateurs compete against each other in locating hidden transmitter (aka the Fox) using an antenna and a receiver provided to them. **Fox Hunt RF Receivers** were made on-campus as a part of summer project.
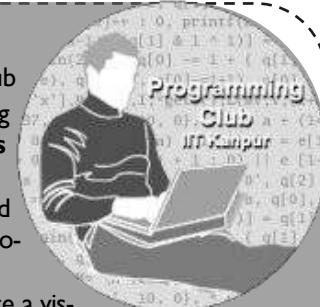- The club equipment availability got enhanced as **two new ICOM mobile sets** (Model: ICOM- V8 and V82 working in the VHF band) were purchased.
- Classes were conducted appropriately to provide training in **Morse code** and brushing-up of basics required for the **ASOC (Amateur station operator's certificate) exam**. You need to pass this exam to get a HAM license. Basic theory of antenna and the simulator was taught and a two-day hand on **workshop on building antennas** was conducted.

HAM receiver

For more details about any club, log on to http://students.iitk.ac.in/snt/

All the information in this article was compiled by Mohit Jolly and Prashant Goyal from the end term report of K. Ashwin (Ex-General Secretary, Science and Technology Council) and the website of Science and Technology Council.

Programming Club:
Crazy about codes and algorithms? This club wishes to become **the topmost ranked page on Google** for the query string "programming club". It had **the maximum number of summer projects completed**. Let's get fascinated by them:

- **Color to Grayscale Conversion Software** aimed at developing a faster and efficient algorithm to convert a color image to grayscale format, without any compromise on the detailed features of original color image.
- **A View of the Universe** created a web based JAVA applet which can generate a visual depiction of the planetary motion and the relative positions based on the date and time provided.
- **Image Manipulation in Mobile -** This is a software developed for Java Mobile Platform (J2ME). The software uses J2ME to allow editing images in Mobile Phones with Java support.
- **Scientific Calculator** aimed at creating a Scientific Calculator with advanced functions like Graph-plotting. The Software was based on JAVA and makes use of the Swing API.
- **Stock Simulator** is a web-based project which simulates the stock market and updates its quotes in real-time (with a maximum of 20 minutes Delay). The users are provided with some virtual money which they can use to purchase stocks virtually. The gains and losses for each user are accumulated and the rank-list is subsequently generated.
- **Course Management System** created a web-based course management system which can be used in educational institutions by instructors for grading and other purposes.
- **Digital Circuit Simulator** created a JAVA application which can simulate the working of a digital circuit. The software allows for creation of custom circuits along with time varying circuits to give the output.

Moreover, weekend programming contests were regularly conducted with Rs. 2000 as prize money. Hacking contests were the craze out here.

Robotics Club:
Last but not certainly the least, this club made a ground-breaking development in the general state of Robotics in student community last year. The club infrastructure improved and students learned how to use new things to experiment.

- The projects completed in summer 2007 are:
1. **The Temple of Rou-Ha –** This problem statement was removed from last two years in a row from Techkriti, since no one could solve it. **The club solved it successfully.**
2. **Amphibian robot -** A bot which could traverse land and water alike, laying the groundwork for the massive participation we saw at the '**Battle for the Atlantic' (ref. Techkriti '08)**
3. **Quadruped (**A robot which can move on 4 legs), **Robotic Arm** and **Micromouse Simulator**
- A first-hand exposure to the technical nitty-gritties of robotics and a raw idea of competition the students might have to face in competitions organised by other colleges & universities, was given through **Technokratics- the annual intra-IITK robotics competition, organized for the first time.**
- The team from the club won **2nd prize in the event "TERRARANGER" at IIT Kharagpur's Technical Festival , KSHITIJ'08.**
- The Robotics Club held a number of Lectures, starting from an **Introduction to Robotics** by Professor Amitabha Mukherjee (Department of Computer Science and Engineering) and an **Introduction to Microcontrollers** by Dr. Susmit Sen (Department of Electrical Engineering). A number of lectures on electronics, microcontroller programming and sensors were conducted throughout the year.
- **Rope climbing robot and 3 degree freedom robot** were major attractions.
- The projects afloat these summers of 2008 are as follows:
1. **Line Follower Robot**: A robot that follow its path along a white line drawn on the floor and is able to move & correct itself as per the changes in the curvatures of the line.
2. **Micromouse** (continued from last year): The maze-solving robot – reaches the centre of the given maze in the shortest possible time.
3. **Robotic Arm** (continued from last year): A robotic hand that can lift and transfer medium-weight objects.
4. **Coordinate Following Robot**: A robot that moves from a given coordinate to the other coordinate that it is asked to go to.
5. **Obstacle Avoiding Robot**: A robot that is able to find its way through the different obstacles that are placed in its path by carefully avoiding them.

Promoting Undergraduate Research
Summer Undergraduate Research Grant for Excellence

Ever thought of leaping into the exciting field of research when you are just 10+2 pass? No! But, we at IIT Kanpur strongly believe in '*You may or may not be able to score a goal in a shot, but shots not taken are always goals missed.*' Hence in order to provide that shot at research at undergraduate level our faculty members have taken an initiative to contribute to the development of students on personal, professional and educational fronts. Thus IIT Kanpur laid the foundation of an undergraduate research programme, SURGE (Summer Undergraduate Research Grant for Excellence) in 2006, with a Memorandum of Understanding (MoU) with the highly acclaimed SURF (Summer Undergraduate Research Fellowship) program of California Institute of Technology (USA).

We, being the leading institute of technology of our developing nation, realize our pivotal role in making India-2020 dream true. Hence every summer SURGE incorporates second and third year undergraduate students from IIT Kanpur and the National Institutes of Technology (NIT) all across the country apart from 3 students from Caltech. Focused research projects are taken up in this programme which runs for a duration of 10 weeks (early May to end July). IIT Kanpur pays a stipend of Rs.10, 000 to the students selected in the programme. There's 10,000 bucks more plus a commendation certificate if you produce research of *exceptional* quality during these 10 weeks. A final technical report needs to be submitted at the end of the program, besides mid-term evaluation(s). Feedback of student experiences in SURGE and a final *Oral Presentation* culminates the programme, with memories to cherish.

All SURGE 2007 students with Dr.S.S.K.Iyer

Undergraduate research *bridges* the gap between class-room education and real world challenges and allows students to *internalize* and take ownership of the process of learning and education. A plethora of opportunities to work under the mentorship of senior researchers at the frontiers of engineering and science is also open to all. It is because of these reasons that programs like SURGE are very important. With a vision of promoting a culture of research and interdisciplinary education in the coming generation, SURGE has been appreciated all over for its 2 nascent years. All students have experienced enhanced and holistic learning as opposed to the "chalk and talk method", and mentors at IIT Kanpur are impressed by the rigor adopted by young researchers. Visit http://www.iitk.ac.in/surge/ugresearch.htm for projects completed in SURGE in last 2 years and further details.

We believe that the dream to become a scientist or an engineer must have crossed your mind at least once. With SURGE and similar programs IIT Kanpur is determined to make those dreams come true. All you have to do is to take your shot when it is your time. Hold your head high when you step into the institute, O "*cream of the country" and bring a SURGE in the heights achieved by IITK.*

Spinning TaLeS (contd.)

"I want to give a talk. What should I do?"
You just need to do a few small things:
- Choose some suitable topic that you have read about, done a project on or that you understand appreciably.
- Then send the following details to arvikot@iitk.ac.in :
1. Title of the Talk,
2. Summary of the content of talk,
3. A date suitable to you for giving the talk

"What is the length of the talk? Et cetera et cetera."
The normal format of TaLeS is:
- Talk/Presentation (45 minutes to 1 hour).
- Discussion (15 minutes or more).
The speakers are encouraged to submit an article (from 500 words to any length you can go to) about the subject area of the talk and their contribution (if any) to research pertaining to it. Note that article should be original and not copy pasted from internet or other sources. If you use any source then you should cite it in the article itself.

"When? Where? How will I know if there is a talk sometime soon?"
TaLeS talks are usually organized on Friday evenings and weekends in a Lecture Hall in the Lecture Hall Complex (LHC) to ensure a decent number of people in the audience. People are relaxed on weekends and much more receptive. We send emails to everybody about the talk and put up posters also. Just look for the strangest posters around and you will know you are looking at a TaLeS poster!

"Tell me about the earlier talks, will ya?"
Eight talks were organized in the last academic year. The details are given below just to tell you what all we did. Hope you like the snazzy names we always come up for these talks. But that should not mislead you to thinking that we are not serious. We just want to prove that science and technology actually are fun to be involved with. Anyway, the details are:

Talk : BLACKHOLE OMELET (Talk on Black Hole Thermodynamics and related issues)
Speaker: Pratyush Pandey (Department of Electrical Engineering)
Pratyush, a first year undergraduate gave this talk about Black Holes and Black hole radiations.

Talk : ZABAAN SAMBHAAL KE (Talk on Programming in Indic Languages)
Speaker: Veerender Kumar (Department of Economics)
In this talk, Veerender Kumar, a first year student department at that time talked about languages, scripts, phonetics and linguistics and about how Sanskrit has been proven to be the most suitable language for computers.

Talk: ONE TWO KA FOUR (Talk on basic number theory)
Speaker: Siddharth Chatterjee (Department of Electrical Engineering)
Siddharth, another first year student at the time he gave his talk, took the audience on an interesting journey through the use of basic number theory. He demonstrated how almost trivial results can be used to derive some astonishing facts about numbers, how number theory can be used in CRYPTOGRAPHY and in predicting astronomical events like eclipses!

Other Talks -
Talk : CHOR POLICE (Talk on a specific problem in combinatorial geometry)
Speaker: Manjish Pal (Department of Computer Science and Engineering)

Talk: GABBAR, KALIYAA ETC. (Talk on manufacturing Optimization using Multiple Armed Bandit Strategy)
Speaker: Shankar Prawesh (Department of Mathematics and Statisctics)

Talk: GUNS AND LASERS (Talk on microstructure engineering using laser surface treatments)
Speaker: Gaurav Mishra (Department of Materials and Metallurgical Engineering)

Talk: ULTA-PULTA (Talk on the Reciprocal System of Universe)
Speaker: V. Gopikrishna (Department of Physics)

Talk: DABBA GOL (Talk on basic theory of computation)
Speaker: Piyush Srivastav (Department of Computer Science and Engineering)

EPILOGUE: "We spin TaLeS! Do you?"
Yeah that's the question we are asking you, 'Do you spin TaLeS?' If yes than just think of a topic on which you can deliver a talk. Not necessarily right away but as you get used to the system here at IIT Kanpur you can think of even more ideas than you can now. Take your time but don't you dare miss a TaLeS talk and yes, do give talk if possible. Research shows that it's good for health! See you in July! Till then and there after keep spinning TaLeS!

Siddhartha Chatterjee got selected in the camp of the INMO-2005 (Indian National Mathematics Olympiad). He also got selected to the Indian Statistical Institute (ISI) for B. Math. Programme in 2007, and preferred coming to IIT Kanpur. He got a distinction in the AUSTRALIAN CHEMICAL QUIZ-2004 and had secured the 5th position twice in the General Knowledge Competitions of the UNITED SCHOOLS ORGANISATIONS, INDIA.

Pratyush won a silver medal at the International Physics Olympiad held at Isfahan, Iran in July 2007. During that time he got interested in Black Holes and the idea of Black hole radiations.

While you were toiling for JEE...(contd.)

ADEX- The Annual Design Exposition

(Continued from page 1)

Aerospace Engineering. It included the glider making event 'Pushpak', the water rocketry contest 'Rocketrix' and 'Cruise Control' to check if you can make an aero-model do seemingly impossible maneuvers in mid-air. Best of the best were seen literally fighting in the Research Paper Presentation Contest rightly called 'Eureka'.

The prize money for all competitions was over Rs. 10 lakhs! Whooping! Isn't it?

EVENTS FOR SCHOOL CHILDREN

Have a glass of water! *'Picture abhi baaki hai mere dost.'* Some of your friends may even have had the wonderful opportunity to see this technical fair in an event organized solely for school students - 'School Bag' and participate in Audio/Visual Quiz, Science Olympiad and attend the legendary talks. Science and society are hand and glove, and we realize that in order to achieve the vision of a developed India we need to inculcate the scientific acumen beginning from the school level itself and hence the event 'School Bag.'

BUSINESS COMPETITONS

We also had a business strategy contest named 'Olymbiz' to crack at problems which have baffled top corporations. One could also have some fun by participating in 'Smart Manager', 'Business Gaming' and our all time favorite 'StockSim'- a virtual trading environment where users traded BSE/NSE stocks on real time prices.

QUIZZES

A lot of quizzes were also organized. Extensive quizzing was done in 'iQUZ', 'Astro Quiz' and 'Inquizition'- the online quiz competition. Astronomy sessions to the furthest reaches of the universes were greatly enjoyed in 'Cosmos' and 'Planetarium'.

EXHIBITIONS AND WORKSHOPS

We had exhibitions from SUBER UBER (http://superuber.com.br) - an interactive media company working at the convergence of art, technology and design, specializing in installations for culture, education, entertainment and advertising. Workshops were conducted for telescope making, astrophotography and software defined radio (SRD). In 'Robokriti', the robot making workshop especially designed for newbie's and robotics enthusiasts of all disciplines, students made a robotic vehicle which can be controlled via wired remote, speech recognition or computer control.

NOVELTY

Ever tried to solve a Rubik's Cube? We had here the first ever official cubing competition in India recognized by World Cube Association- **IORC (Indian Open Rubik's Cube Contest)**. It was open to people of all age and nationality.

Keeping in pace with the growing 'scope' of biotechnology, we had the 'Bio-Business Plan' to combine biology and business acumen to come up with the best venture.

FOSSKriti- a mini conference on FOSS (Free and Open Source Software) added a feather to our cap. FOSS means software that is liberally licensed (and is thus Free, in the sense of the word Freedom) so as to allow and encourage you to look at the code, make any changes you want, and distribute the modified code as you please. The online treasure hunt 'TesseracT' added great fun to the event.

FUN EVENTS

Don't worry fun-seekers! The best part is yet to come in 'Nucleus'- the fun centre. Watching movies in

'Open Air Theatre' was the best way to start your day at 00:00am. We respected your talents in paper Plane Flying, cycle dismantling and jigsaw puzzling too.

PROFESSIONAL SHOWS

Now comes one of the events for which Techkriti-08 will be cherished the most- 'Polaris – the professional shows'. Opening show 'Flux' by 'Feeding the Fish'- a completely unique glow technical juggling act using state of the art lighting effects and lasers was an unforgettable visual experience (see photograph). What is life without music and what is music without "Strings"? The king-size finale of Techkriti with the awesome music of "Strings," one of the oldest Pop-Rock bands of the Indian subcontinent, mesmerized one and all.

We hope that after reading all this you now know what a grand festival 'Techkriti-08' was! In fact it was the biggest student festival ever organized in IIT Kanpur in every respect. For this let's appreciate the team of Techkriti-'08 who worked continuously for several months to make history. The team of Techkriti-'09 is all set to take the reins in their hands and lead the golden chariot further to avenues unexplored. We hope that you will participate enthusiastically in Techkriti '09. We promise it to be the time of your life.
Do not forget to watch the promotional video for Techkriti 08 here: http://www.youtube.com/watch?v=MJBppLt5spI
For more details, log in to www.techkriti.org ⌗

Adex is the annual design exposition organized by IIT Kanpur as a part of its Master of Design (M.Des.) Program. Design Program is a center for creative minds which encourages students to bring in synthesis of varied knowledge domains to create innovative solutions towards the betterment of society. Adex is the culmination of the year long conceptualization and innovation in design done by the Design Program students. The expo involves display of ergonomically designed products ranging from simple soap-box to state-of-the-art Public Transport Vehicles! Other interesting items like comics and illustrations created by students are also put on display. This year the event was held from March 30, 2008 to April 01, 2008. It was inaugurated by Prof. Prashant Kumar (HOD, M.Des.) and displayed innovative concepts and products in the field of product design, graphics and media. He told about the two aspects of designing-specific requirements of a particular industry for product and the needs of the society in general. Dr. Amitabha Mukherjee, Professor in the Department of Computer Science and Engineering, spoke on the topic **"Innovation: Art Engineering and Pedagogy**."

Also a platform for interaction between the industry and the academia, Adex has acclaimed designers and experts as a part of their panelists and speakers every year, contributing their insights and experience on the challenges and opportunities in design. *Never miss this expo! It is simply fabulous.*

For more details, log in to www.iitk.ac.in/design/Events/ADEX08.html ⌗

Nerd Herd

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WHAT'S UP NEXT?

Highlights of Vol. 1 No. 1 of NERD:

- **ATLAS SHRUGGED** (Cover Story)- Gluco-Band (a novel way to deal with Diabetes Mellitus)– by Vikram Pagaria, Rohitesh Gupta and Parag Surana

- **CYCLEMAN** (Notes on electricity run bicycle developed by an IIT Kanpur Student) - by Kunwar Apoorva Singh

- **SHE- Frances Allen** (First female Turing Award winner)- an interview by Nishith Khantal and Arvind Kothari

- **A force from nothing- the 'Casimir Effect'**- by Parul and Avirishu

- **Dhwani- Let's Echo!** (Notes on programming in Indian Languages)– by Veerender Kumar

And many more articles…Don't forget to grab your copy.